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TITLE : PROTECTION OF COATING FILM

ABSTRACT : PURPOSE: To get rid of both wax coating operation and lack of protecting ability by covering the surface of an automobile body on which coating is completed with a specified plastic film.

CONSTITUTION: The surface of an automobile body with a completed coating is treated both by adhesion of a plastic film with a thickness of 1-1,000 μ m having a pressure-sensitive peelable self-adhesive layer with an adhesive force of 50-1,000g/25mm and a thickness of 1-500 μ m and by covering it with a heat-shrinkable plastic film with a thickness of 5-1,000 μ m, a heat-shrinking ratio of 10-50% and a strength of 4-10kg/25mm and shrinking it into an aimed shape by heating at 60-110°C for 1-5min or either by one of them to temporarily protect a top coating surface of the automobile with a completed coating.

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SPECIFICATION

1. Title of the Invention

Method of protecting coated films

2. Scope of the Patent Claim

A method of protecting coated films where the top-coat painted surface of a painted automobile is temporarily protected by carrying out on the body surface of a painted automobile either one or both of (A) sticking a plastic film which has a pressure-sensitive re-peelable adhesive layer on the body surface and (B) envelopment in a heat-shrinkable plastic film which is shrunk to the intended shape by heating.

3. Detailed Description of the Invention

Industrial Field of Application

The invention concerns a method for the temporary protection of the painted film surface of a painted automobile. More precisely, the invention concerns a method whereby an automobile body is temporarily protected by sticking on or envelopment in a film which matches the shape of the painted automobile body.

Prior Art and Associated Problems

In recent years, scratching, loss of gloss, and fading and changes in colour have arisen during the transportation of painted automobiles as a result of the effects of stones, dust, iron filings, gas, chemicals and the like and this has resulted in a marked lowering of the commercial value and it has become something of a problem. With long distance transportation and with exportation overseas in particular the probability of damage occurring is considerable. Consequently, methods in which wax is coated to a depth of from 20 to 40 μm on the painted product have often been adopted in the past, but with these methods the thickness is not fixed and so a uniform level of protection is not obtained, and the wax is easily contaminated and weak in respect of acid rain: there may be adverse effects due to permeation into the paint film, and large amounts of solvent are dissipated during the wax coating operation and there are other disadvantages such as the fact that waste water treatment is required when the wax is removed, and, moreover, there are a large number of processes and great expense is inevitably incurred with these methods.

Means of Resolving These Problems

The inventors have discovered, as a means of resolving the abovementioned problems, a coated film protecting system in which a certain type of film is stuck

onto, or made to envelope, a painted automobile body with the same shape as the body to protect the top-coated paint film and in which, after it has served its purpose, the film is simply peeled away.

That is to say, the invention is a method of protecting coated films where the top-coat painted surface of a painted automobile is temporarily protected by carrying out, on the body surface of a painted automobile, either one or both of (A) sticking a plastic film which has a pressure-sensitive re-peelable adhesive layer on the body surface and (B) envelopment in a heat-shrinkable plastic film which is shrunk to the intended shape by heating.

The plastic film, which has a pressure sensitive re-peelable adhesive layer (re-peelable film) which is used in the invention, comprises generally a separating sheet (1), a pressure sensitive re-peelable adhesive layer (2) and a plastic film layer (3), and when a re-peelable film is used, the separating sheet is stripped away from the adhesive layer and the film is applied from the end of the automobile body on which the painting has been completed and pressed successively into place with a rubber roller or squeegee and finally stuck over the whole surface of the automobile body to protect the whole surface of the automobile body.

The separating sheet (1) is a sheet which is stuck onto one side of the pressure sensitive re-peelable adhesive layer and in this invention it is not directly concerned with the protection of the automobile body. Paper or film which has been coated or impregnated with a mould release agent, such as a silicone resin, fluorinated resin or wax for example, or a resin such as polypropylene or polyethylene which itself has mould release properties without the inclusion of the abovementioned mould release agents, can be used, for example, for the separating sheet.

The pressure sensitive re-peelable adhesive layer (2) is a layer which sticks the plastic film layer to the surface of the material which is to be covered, and it is present between the separating sheet and the plastic film layer. The adhesives which are suitable for this purpose are those which have an adhesive strength of from 50 to 1000 g/25 mm, and those with an adhesive strength of from 200 to 500 g/25 mm are especially desirable. That is to say, it preferably has an adhesive strength such that it can be peeled off easily when it is to be peeled off but such that it does not peel off in the natural state. In practice, known resins such as natural rubber, styrene-butadiene copolymer rubber, polyisobutylene, acrylic resins,

poly(vinyl ether), poly(vinyl isobutyl ether) and the like can be used alone or as the main component, and from among these resins the acrylic resins which have a glass transition temperature of from -10 to -60°C , such as poly(butyl acrylate) and poly(2-ethylhexyl acrylate) for example, are preferred. Moreover, rosin, rosin esters, coumarone resins, starch resins, hydrocarbon resins, oil-soluble phenolic resins can be used conjointly, as required, as appropriate tackifiers, and fatty acid esters, animal and vegetable oils and fats, waxes and petroleum heavy fractions can be used conjointly, as required, as appropriate softening agents, according to their compatibility with the abovementioned resins. Fillers, pigments, anti-ageing agents and stabilizers etc. can also be compounded, as required.

A thickness of from 1 to $500\text{ }\mu\text{m}$ is appropriate for the said adhesive layer, and a thickness of from 20 to $40\text{ }\mu\text{m}$ is especially desirable.

The plastic film layer (3) is stuck onto the other side of the pressure sensitive re-peelable adhesive layer and, in this invention, in practice it protects the automobile body from external effects. A thickness of from 1 to $1000\text{ }\mu\text{m}$ is appropriate for this plastic film and a thickness of from 30 to $50\text{ }\mu\text{m}$ is especially desirable.

In practical terms, plastic films comprising polyurethane, polyimide, nylon, polyethylene, polyester, polycarbonate or plasticized poly(vinyl chloride) resin, for example, can be used.

In those cases where, in this invention, a heat-shrinkable type plastic film is used, the painted automobile body is covered with the plastic film and parts are fixed with adhesive or retainers in such a way that there are no large loose parts when the film is shrunk and then it is made to shrink to the shape of the automobile by heating and the automobile is enveloped and the surface of the automobile body is protected. The appropriate film thickness for the said heat-shrinkable type plastic film is from 5 to $1000\text{ }\mu\text{m}$, and a film thickness of from 10 to $50\text{ }\mu\text{m}$ is especially desirable. Furthermore, the appropriate heat-shrinkage rate is from 10 to 50% , and a heat-shrinkage rate of from 10 to 30% is especially desirable. The film strength is preferably from 4 to 10 kg/25 mm . In practical terms, plastic film comprising polyethylene, polypropylene or plasticized poly(vinyl chloride) resin, for example, can be used. The adhesive which is used for fixing the film is preferably one of which the adhesive strength is not changed by heating. The appropriate adhesive strength is from 50 to 1000 g/25 mm , and an adhesive strength of from 200 to 500 g/25 mm is

especially desirable. In practical terms, poly(vinyl ether), poly(vinyl isobutyl ether), acrylic resins and the like can be used. Moulded reinforced plastics, re-peelable double-sided sticky tapes and re-peelable type adhesive coated magnets, for example, can be used as retainers. The heating temperature at which the plastic film is shrunk is preferably from 60 to 110°C and the appropriate heating time is from 1 to 5 minutes, a temperature and time at which the plastic parts provided inside the painted automobile and the quality of the top-coat paint film are not adversely affected. After shrinking the plastic film and enveloping the automobile body, the excess parts are cut off and removed to improve the appearance of the product.

In this invention, the objective of protection can be achieved with either a re-peelable film or a heat-shrinkable film, but when a re-peelable type of film is stuck to the whole surface some effort is required for its removal, and with the heat-shrinkable type of film some effort is required for applying the adhesive. Thus operability can be improved even further by using both methods conjointly. That is to say, after covering the automobile body with a heat-shrinkable plastic film, the end parts are fixed in such a way that the edge parts are enveloped with a re-peelable film and both application and peeling can thus be carried out easily.

Furthermore, if the heating operation for shrinking the film is omitted, a thermally-shrinkable film can be pre-moulded to the shape of the automobile body and in use, the painted automobile can be covered with this pre-moulded film and the edge parts can be fixed with re-peelable film or with a retainer such as a moulded reinforced plastic, re-peelable type double sided sticky tape or re-peelable adhesive coated magnets for example.

Effect of the Invention

By means of the invention it is possible to protect very simply and more effectively the surface of an automobile body which has been painted without encountering the various problems such as the cost of the facilities for a wax coating operation and solvent dispersal, inadequate protection, adverse effects due to permeation into the paint film, and waste-water treatment on washing off the wax, for example, which arise on coating with wax in accordance with the conventional method.

Illustrative Examples

The invention is described below by means of illustrative examples.

Example 1

A re-peelable plasticized poly(vinyl chloride) film (produced by the Sane Kagaku Kogyo Co.) was cut to the body shape of an automobile and in accordance with the usual sticking procedure for a sticky tape the end part of the separating sheet was removed and the sticky surface so revealed was fixed by press bonding into the end of the automobile body and then the separating sheet was peeled away gradually and the film was press bonded all the way to the other end in such a way that no air bubbles were entrapped, using a squeegee, and the bonding operation of the film was completed. This was left to stand at room temperature and, after 3 months, the film which had been stuck on the automobile body was peeled away from one end and it could be peeled away easily and no abnormality was seen in the state of the paint film on the surface of the automobile body.

Example 2

A polyethylene-based heat-shrinkable film (produced by the Okura Kogyo Co.) was cut to the shape of an automobile and, after covering the automobile with this sheet, the ends were fixed in such a way that the edges were enclosed using a re-peelable type plasticized poly(vinyl chloride) film and the same ends were press bonded using a squeegee. The automobile body was then heated to 80°C for 5 minutes and the heat-shrinkable film was made into a good fit on the automobile body. This was left to stand at room temperature and, after 3 months, the film which had been stuck on the automobile body was peeled away one end and it could be peeled away easily and no abnormality was seen in the state of the paint film on the surface of the automobile body.

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